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Pricing, Cost Recovery, and Production Efficiency in Transport

A Critique

Rachel E. Kranton

Public sector pricing policies may undermine incentives to reduce costs. Therefore measures to promote cost reduction should be part of any pricing policy reform designed to increase cost recovery.

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This paper — a product of the Transport Division, Infrastructure and Urban Development Department — is part of a larger effort in PRE to improve policies on pricing, cost recovery, and efficient resource use in transport. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Wendy Wright, room S10-055, extension 33744 (45 pages).

Drawing on developments in industrial organization and analyzing the U.S. experience in reforming Conrail, Kranton emphasizes that policies to reform public enterprises should first promote cost reduction. Pricing policies aimed at cost recovery should be undertaken only in conjunction with general enterprise reform, to ensure that the pricing scheme does not undermine the enterprise's financial and operational discipline.

Kranton discusses five sources of inefficiency in public transport:

- The goals of the enterprise or the regulation of its operations.
- The structure of the output market.
- The control mechanism between government and the enterprise.
- The managerial incentive structure.
- The conditions of employment.

Even when public enterprises are bent on maximizing consumer welfare, costs are not necessarily minimized. Control mechanisms that allow for asymmetric information between layers of management and provide performance incentives encourage efficiency. Regulation may cause inefficiency by distorting incentives and creating protected markets. And enterprises that operate in uncompetitive markets may face little pressure to operate efficiently.

Lack of competition may also exacerbate the problem of asymmetric information between owners and managers. Owners of public firms — citizens and taxpayers — are unlikely to exert pressure on public enterprises to operate efficiently. And public firms may be protected from insolvency by "soft" budget constraints.

Kranton points out the need for an integrated theory of public production (to help formulate policies to minimize costs) and more empirical work to explain the differences in costs between public and private enterprises.

PRICING, COST RECOVERY, AND PRODUCTION EFFICIENCY IN PUBLIC TRANSPORT: A CRITIQUE AND AGENDA FOR REFORM 1/

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1/ This paper was prepared as part of a project on Pricing, Cost Recovery, and Efficient Resource Use in Transport. It was prepared by Rachel E. Kranton, Consultant, under the direction and with the assistance of Ian G. Heggie, INUTD.

I. INTRODUCTION

1. Little theoretical work has been devoted to developing an integrated theory of public production to analyze the impact of pricing and cost recovery policies on public sector efficiency. The principles for cost recovery are based on the optimal pricing literature: the derivation of prices to raise a given level of revenues while minimizing welfare losses. In the analysis, however, an implicit assumption is made: public sector managers minimize production costs. In their work on transport tariffs, Allais and others writing for the EEC emphasized in 1965 that cost minimization was an essential condition for optimum allocation of resources: "cost minimization may be regarded as having a certain logical priority and it must be clearly understood that in practice if costs are not minimized, most of the criteria corresponding to optimal allocation of resources can only have a very limited effect."1/ However, minimizing costs, has not been given priority in theories of pricing and cost recovery, or in their application. The assumption of efficient production, borrowed directly from the theory of perfectly competitive markets, precluded consideration of market imperfections which might undermine the way in which prices influence allocative efficiency. It also discouraged the search for alternative measures, such as cost reduction, to improve allocation of resources. Furthermore, application of optimal pricing regimes without regard to the true origin of costs could, at best, distort consumer prices -- creating further allocative inefficiency -- and, at worst, undermine incentives to promote production efficiency.

2. The purpose of this paper is to assess the efficacy of optimal pricing formulas for pricing and cost recovery and to develop a general framework within which to analyze the performance of public transport.

1/ Maurice Allais, et al., Options in Transport Tariff Policy, European Economic Community, Transport Series 1, Brussels, 1965, p. 36.

Part II critiques the optimal pricing literature and its policy prescriptions for cost recovery. Part III presents theoretical work in other fields such as industrial organization, principal-agent problems, and privatization which try to explain the lack of cost minimization in public enterprises. Four departures from perfectly competitive markets are considered: asymmetries of information (the principal-agent problem), regulation, non-competitive markets, and imperfect capital markets and public ownership. This leads to Part IV which derives a general analytical framework to analyze causes of production inefficiency in public transport. Part V uses the framework to analyze the reform of Penn Central Railroad in the U.S. which led to the creation of Conrail.

II. OPTIMAL PRICING POLICIES AND COST RECOVERY

3. The basic principles of optimal pricing and taxation for cost recovery in public production can be divided into two categories: optimal prices/taxes to raise a given amount of revenue from the economy as a whole and optimal prices for individual firms operating under a budget constraint. In both approaches, public production is assumed to be efficient. World Bank policies for general cost recovery 2/ and pricing and cost recovery in transport 3/ are based on this optimal price theory. However, the application of these pricing formulas when costs are not minimized, can undermine the welfare gains usually associated with introduction of an optimal pricing regime. Furthermore, in the economy-wide case, instituting a system of optimal taxes and transfers when costs are not minimized can itself be a cause of inefficiency in the public sector.

Economy-Wide Optimal Taxes

4. Frank Ramsey derived an optimal system of economy-wide taxes in his 1927 article by solving the problem of maximizing total welfare subject to the constraint that the state must raise a certain amount of revenue through taxation.4/ He concluded that the ad valorem tax on each commodity should be proportional to the sum of the inverses of the supply

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2/ World Bank, "Cost Recovery Policies for Public Sector Projects", Operational Manual Statement 2.25, 1977.

3/ Bennathan, E. and A. Walters, "Port Pricing and Investment Policy for Developing Countries", O.U.P., 1977; Churchill, A., "Road User Charges in Central America," Johns Hopkins U. Press, Baltimore, 1972; Newbery, D. et al, "Road Transport Taxation in Developing Countries: The Design of User Charges and Taxes for Tunisia", Discussion Paper 26, World Bank, Washington, 1987; Walters, A., "The Economics of Road User Charges," Johns Hopkins U. Press, Baltimore, 1968.

4/ Frank Ramsey, "A Contribution to the Theory of Taxation," The Economic Journal, Vol. 37, 1927, p. 47-61.

and demand elasticities. The policy recommendation arising from this result is that to minimize welfare losses, commodities which are relatively inelastically supplied and demanded should be taxed. The revenues raised by these taxes should then be used to fund general government services, together with the deficits of public enterprises and other public agencies.

5. In a 1937 address Hotelling proposed a pricing policy for U.S. railroads and bridges based on this theoretical argument.5/ He recommended that to maximize welfare,6/ bridge tolls should be zero, while railway fares should be set equal to the marginal costs of carrying one additional passenger, or servicing a single shipment of freight. Revenues to meet the bridge and railway deficits resulting from charging marginal costs should be raised through income, inheritance, or land taxes. Setting tolls above zero, or charging fares above marginal costs, would entail a loss in welfare since it would encourage customers to turn to alternative travel modes -- the demand for bridges and railways was assumed to be elastic. On the other hand taxing income, inheritance, or land would entail minimal loss in welfare because these items were assumed to be inelastically supplied.

6. In a recent paper Heady reiterates the above recommendation: to minimize welfare losses ("distortionary costs") public sector prices should take into account relative elasticities of demand for publicly-produced goods and services as well as for commodities taxed by the

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5/ H. Hotelling, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates," Econometrica, Vol. 6, 1937, p. 242-269.

6/ Welfare in this case is the sum of consumer surplus, producer surplus, and government revenue. The loss in welfare by pricing above marginal costs would therefore equal the standard dead weight loss triangle.

government.7/ Individual enterprises should not be subject to their own financial constraints, rather

> "prices should be raised on those goods with a high ratio of marginal gain to marginal distortionary costs, and lowered for those where that ratio is low . . . this leads to the well-known rule that the ratio of consumer price to producer price should be inversely proportional to the own-price elasticity of demand" 8/.

Optimal Prices for Individual Firms

7. Pricing rules for individual enterprises facing financial constraints were derived by Boiteux 9/ and Baumol and Bradford.10/ Many public sector firms are characterized by increasing returns to scale, which means that marginal cost pricing would result in negative profits and financial deficits.11/ They therefore determined the optimal prices above marginal costs which allowed a nationalized industry to earn a specified level of profits.12/ Maximizing consumer welfare (the compensating variation) subject to the enterprise's budget constraint yielded the now well-known equations for optimal prices: the percentage markup of price over marginal cost is inversely proportional to the own-

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7/ C. Heady, Public Sector Pricing in a Fiscal Context, The World Bank, PPR Working Paper No. WPS-179, 1989, p. 13-30.

8/ Ibid, p. 26. Heady also considers the distributional impact of public sector pricing and recommends weighting consumer losses according to the distribution of income.

9/ M. Boiteux, "On the Management of Public Monopolies Subject to Budgetary Constraints," Journal of Economic Theory, 3, 1971, p. 219-240. English translation of the original French article "Sur la gestion des Monopoles Publiques astreints a l'equilibre budgetaire," Econometrica, Vol. 24, No. 1, Jan. 1956, p.22-40.

10/ W. Baumol and D. Bradford, (1970) "Optimal Departures from Marginal Cost Pricing," American Economic Review, Vol. 60, p.265-283.

11/ In transport, fixed costs include the initial capital investment and maintenance expenses to protect infrastructure from weathering.

12/ These profits could be equal to zero.

price elasticity of demand.13/ In practice, this method of pricing has been simplified to the problem of maximizing welfare, defined as consumer surplus alone or the sum of consumer and producer surpluses, subject to the enterprise's budget constraint.

8. The designation of the prices derived by Boiteux, Baumol and Bradford as "Ramsey prices" is often a source of confusion. To reiterate the difference: Ramsey, Hotelling, and recently Heady concerned with the government's fiscal position, found that to raise a required level of general revenue, taxes should be levied on goods inelastically supplied or demanded. Boiteux and Baumol and Bradford, on the other hand, were concerned with the firm's financial position and developed an optimal way of setting prices above marginal costs in a manner which minimized welfare losses while raising sufficient funds from the buyers of the good or service produced.

Extensions and Applications of Optimal Pricing Literature

9. The pricing theory presented above spawned a body of literature which extended the basic models to account for more complicated circumstances such as externalities (including congestion), tax incidence and income distribution.14/ These pricing rules can be applied to all public agencies including airlines, railroads, toll bridges, and urban traffic.15/

13/ An enterprise which produces more than one commodity would also need to consider how increasing the price of one commodity affects the demand for the other commodities produced (the cross-price elasticity of demand) and thus the enterprise's total revenue potential.

14/ See Dieter Bos, "Public Sector Pricing," Chapter 3 of Handbook of Public Economics, Vol. I, A.J. Auerbach and M. Feldstein (eds), North Holland, 1985, p.182-183.

15/ Ibid, p. 130.

10. Current Bank policy on cost recovery is based on the above theoretical work on optimal pricing and taxation. Operational Manual Statement 2.25, "Cost Recovery Policies for Public Sector Projects" -- which is concerned with recovering the costs of public sector investments through pricing or taxation -- reflects the continued reliance on the theoretical pricing literature:16/

> The revenues resulting from charging such "efficiency prices" (marginal cost prices) may or may not recover the total financial cost of the facilities provided. The second set of considerations relates to the desirability of adjusting the efficiency prices (optimal pricing above marginal cost), or charging alternative taxes (optimal general taxation), because of fiscal and financial concerns . . .(emphases added)

11. In the transport sector internal Bank research has provided detailed guidance for pricing and cost recovery in roads (both urban and inter-urban) and ports. Summaries of these recommendations can be found in the EDI publication Pricing Policy for Development Management.17/ Recent work on roads emphasizes the use of road user charges to recover the costs of the road network.13/ The derivation of "optimal" road user charges to minimize the distortion in consumption is reminiscent of the Ramsey pricing formulas for the entire economy presented above.19/ In the railways sector, where the emphasis has been on improving costing systems,

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16/ The World Bank, OMS 2.25, 1977, p.1.

17/ Meier, Gerald M. (ed.), Pricing Policy for Development Management, Economic Development Institute of the World Bank, the Johns Hopkins Press, Baltimore, 1983. See Chapter 4.2 for bridges, Chapter 4.7 for roads, Chapter 4.8 for ports, and Chapter 4.11 for general prescriptions for transport pricing.

18/ See D.M. Newbery et al., Road Transport Taxation in Developing Countries: The Design of User Charges and Taxes for Tunisia, World Bank Discussion Paper No. 26, 1987 and review in Vincent Hogg, Pricing and User Charging in the Transport Sector: A Review of FY88 Transport Project Operations, The World Bank, Report INU-OR1, April 1989, p. 11.

19/ Op Cit, Newbery et al., p. 55 and p.75.

more attention has focused on financial viability and the importance of raising revenue to cover total costs through pricing.20/ For ports, theoretical work conducted by the Bank established marginal cost pricing as the proper basis for tariffs.21/

Problems Caused by Assuming Cost Minimization

12. The theoretical work which provided the basis for these pricing policies maintained the assumption of efficiency in public sector production. This tendency was so strong that even in models which assumed objectives other than profit-maximization or welfare-maximization -- goals such as politicians maximizing votes, bureaucrats maximizing budgets, or managers maximizing output or revenue -- the assumption of efficient production was maintained.22/ The convenience of assuming minimum costs is understandable in theoretical work, but maintaining this assumption in application when it frequently does not hold could, at best, distort consumer prices -- creating further allocative inefficiency -- and, at worst, create additional incentives for inefficiency.

13. Optimal prices for individual firms are those prices which minimize the loss to welfare from pricing above the minimum marginal cost. The basic reasoning is that welfare will be maximized when prices reflect the relative scarcity of goods.23/ If costs are not minimized, then prices set according to the above principles would be based on inflated costs and will not accurately represent the opportunity costs of producing the goods. The price signal which consumers receive is then distorted beyond that of the distortion associated with pricing above marginal cost.

20/ Op Cit, Vincent Hogg, p. 20.

21/ Op Cit, Vincent Hogg, p. 26. See E. Bennathan and A.A. Walters, Port Pricing and Investment Policy for Developing Countries, World Bank Research Publication, O.U.P., 1977.

22/ Op Cit, Dieter Bos, p.182-183.

23/ Op Cit, Dieter Bos, p. 165.

In addition, the inflated prices pass on to the consumers the costs of entropy and inefficiency in the public firm.24/ Setting prices above marginal costs in proportion to the inverse of the demand elasticity for a single firm's prices minimizes the familiar dead-weight loss triangle. However, if the costs of the public sector enterprises are not minimized, the loss of welfare would be higher. The loss to welfare from charging above the true marginal cost would be the sum of the loss in welfare from pricing above marginal cost (the dead-weight loss) and the loss in welfare from the reduction in net potential surplus. This is shown in Figure 1.

14. Economy-wide systems of Ramsey prices set taxes on commodities which are relatively inelastically supplied and demanded. Under such a scheme certain public enterprises, those that produce goods with relatively elastic demands, would receive transfers from the government to meet their costs. Not considered in the pricing literature is the possibility that receiving these transfers might loosen the constraints under which the firm operates and lessen the incentive to minimize costs. Receiving regular and continuous transfer payments to cover deficits "softens" the budget constraint of the recipient firm 25/. A decision-maker, constrained by a "hard" budget constraint to cover total costs with only the revenue raised by sales, will exert efforts to minimize costs, lest the costs exceed the revenues. A "soft" budget constraint cannot act as the same ex ante behavioral constraint on management. The management is not required to make expenditures equal to or less than total revenues, and therefore has little incentive to minimize costs. Managers come to rely on the transfer payments and correctly expect that their firm will receive transfer payments to cover costs. Ex post costs are covered, but

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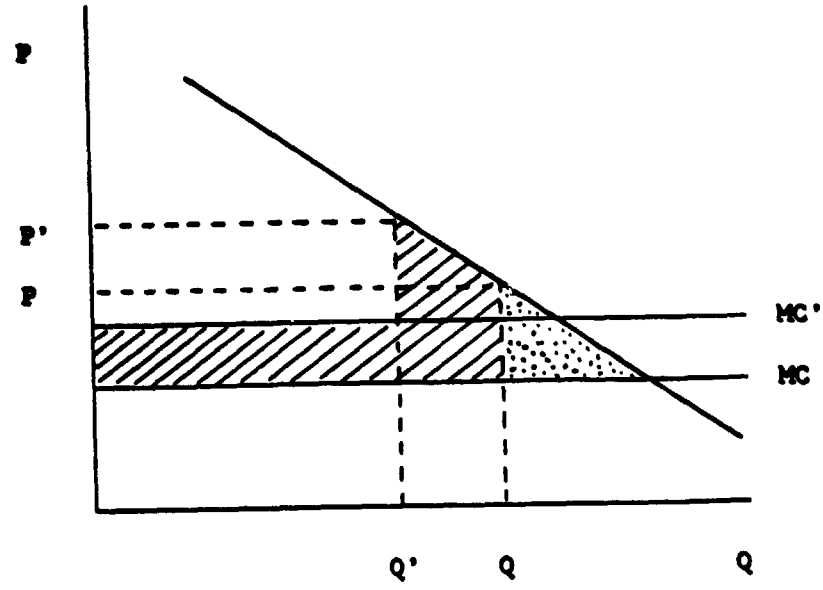
24/ H. Leibenstein, Beyond Economic Man, Cambridge, Harvard University Press, 1976, p. 72.

25/ Tax exemptions, soft credit, and adjusting the selling price also soften a firm's budget constraint. See Janos Kornai, "Adjustment to Price and Quantity Signals in a Socialist Economy," Economie Appliquee, Vol XXXV, No. 3, 1982, p. 506-507 and Comments on Papers Prepared in the World Bank about Socialist Countries, The World Bank, CPD Discussion Paper No. 1985-10, March 1985.



P is the price based on minimum marginal costs, MC. Q is the quantity sold at that price. The welfare loss associated with the increase in price above marginal costs is represented by the shaded triangle.

P' is the price based on the inflated marginal costs, MC'. Q' is the quantity sold at price P'. In this case, the welfare loss associated with the increase in price above minimum marginal costs is represented by the area of both the shaded triangle and the cross-hatched area.

Figure 1. Loss in welfare associated with pricing above marginal costs when marginal costs are inflated.

the budget constraint no longer constrains managerial behavior and becomes merely an accounting or book-keeping identity. Conversely, financial targets and binding profit constraints could increase managerial efforts to minimize costs under specific assumptions about managerial objectives.26/

Empirical Evidence

15. Empirical studies have shown that costs tend to "drift" in firms which receive subsidies from government to cover deficits. Lump-sum subsidies in the regulated public buses in the U.S. were shown to result in cost increases.27/ A comparative study of publicly-owned bus companies in OECD countries showed that twenty-five to fifty percent of transfer payments were absorbed by increased unit costs.28/ The relevant question for welfare analysis, however, is a comparison of the gain in welfare from instituting optimal prices and the loss in welfare associated with cost drift. Heggie has demonstrated that a 20% increase in prices has the same absolute effect on welfare as a 2% decrease in costs in a market with unitary elasticity of demand.29/ Reductions in costs have an even larger relative welfare gain when there are increasing returns to scale, as is the case in many transport enterprises. The implicit assumption of minimum costs in pricing literature, is therefore not a neutral assumption and may even contribute to the problem of public sector inefficiency. If pricing is to be the instrument of choice for cost recovery, care should be taken to insure that instituting a pricing scheme

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26/ H. Gravelle and E. Katz, "Financial Targets and X-efficiency in Public Enterprise," Public Finance, Vol. 31, 1976, p. 218-234.

27/ Moshe Kim and Menahem Spiegel, "The Effects of Lump-Sum Subsidies on the Structure of Production and Productivity in Regulated Industry," Journal of Public Economics, Vol 34, 1987, p.105-119.

28/ P.H. Bly, F.V. Webster, and Susan Pounds, "Subsidization of Urban Public Transport," Supplementary Report No. 766, Transport and Road Research Laboratory, Crowthorne, U.K., 1983.

29/ Ian Heggie, Pricing, Cost Recovery, and Efficient Resource Use in Transport, The World Bank, INUTD Discussion Paper, December 1989, p. 17.

does not undermine the financial and operational discipline of the enterprise.

III. CAUSES OF INEFFICIENCY IN PUBLIC TRANSPORT

16. Public transport enterprises often have explicit goals which may be quite different from the efficient provision of services. Enterprises may have multiple objectives such as: providing jobs with secure salaries as a type of employment program,30/ maximizing passenger miles, maintaining a network of services, providing low cost services to rural and urban poor, etc.31/ These objectives may be explicit goals of the enterprise, or imposed by government on the enterprise through regulation. The pursuit of these other goals can cloud the issue of cost minimization. For example, a railroad whose goal is to provide both employment and railway services will not minimize costs in the commonly-understood sense.32/ The railroad will employ more labor in the provision of railroad services than with the "optimal" combination of inputs which minimizes costs, given market wages and prices. The pursuit of explicit goals other than welfare maximization, such as those mentioned above, result in the lack of cost minimization in public transport and can be readily identified as causes of high operational costs. Furthermore, theoretical work in the fields of mechanism design, industrial organization, and privatization provide reasons to believe that public sector production may be inefficient even in the most restrictive case when government has the single goal of maximizing consumer welfare.

30/ See Alice Galenson, Labor Redundancy in the Transport Sector, The World Bank, PPR WPS-158, February 1989, p. 27-32.

31/ Eric W. Beshers, A Survey of Restrictive Practices on Railways in Developing Countries, p.11. Forthcoming INUTD publication.

32/ Given the goal of creating employment opportunities, the relevant question becomes not the efficiency of the operation, but the effectiveness of the enterprise in accomplishing this goal. Arturo Israel discusses the difference between "effectiveness" and "efficiency" in Institutional Development, Incentives to Performance, The John Hopkins University Press, Baltimore, 1987, p. 12-14.

Problems of Control and the Principal-Agent Problem

17. The principal-agent problem is a problem of control: the principal is the party which establishes control and the agent is the party which operates under those controls and has access to private information.33/ In the private sector, for example, managers of a firm know the level of effort they exert on the job, while shareholders cannot directly observe these efforts. In order to induce the manager to exert the optimal amount of effort, the shareholders can design a contract, a control mechanism, that induces the manager to undertake the optimal level of effort. This contract provides incentives for the manager at the least cost to the shareholders and minimizes the loss in efficiency which arises from the inability of the shareholders to directly observe the managers' effort. In the public sector we can identify a hierarchy of control and an associated principal-agent problem at each level:34/

OWNERS = TAX-PAYERS/CITIZENS
GOVERNMENT
ENTERPRISE
MANAGERS
EMPLOYEES

18. At each layer the principals and the agents may have well-defined yet different goals and have access to different information, thus creating the possibility of inefficiency. An optimal control mechanism between each layer could reduce the inefficiencies which result from the inability of the principal to directly observe the actions of the agent. Defining and describing the nature of the existing control mechanism between each level could provide valuable insight into the source of inefficiencies in public sector production. Once the nature of the

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33/ David Sappington and Joseph Stiglitz, "Information and Regulation," in Public Regulation, Elizabeth Bailey (ed.), MIT Press 1987, p. 6-7.

34/ A similar hierarchy can be described for private sector production: OWNERS - MANAGERS - EMPLOYEES.

control relationship is understood, the principal's access to information can be expanded and the mechanisms of control can be restructured in order to reduce operational inefficiency. Some insights on three important levels of the control problem are presented below: (i) between owners and managers; (ii) between managers and labor; and (iii) between government and the enterprise.

Owners and Managers

19. In large organizations, there is often a separation of ownership and control. The managers of the firm, rather than it's owners, are also likely to have better, if not exclusive, information about the firm's costs, operations, and market structure and their own effort.35/ Owners and managers also pursue different objectives. Owners are usually assumed to be solely concerned with maximizing profit, in the case of private firms, or maximizing total welfare, in the case of public firms. Managers' utility, in both cases, is assumed to depend on their own monetary reward and the level of effort they exert on the job. In order to reduce the divergence between these goals, a contract can be designed which induces the management to act to maximize the owners'objectives. The owner's problem is to design a contract, a wage agreement, which induces managers to exert the optimal level of effort: the level of effort which maximizes profit in the private case and welfare in the public case. However, the owner cannot directly observe the level of effort exerted.

20. The problem of designing optimal contracts must consider this asymmetry in information between owners and managers. With perfect information, owners would be able to directly relate salaries to effort. However, in both the public and large-scale private sector, owners are

35/ In the theoretical literature a distinction is made between hidden actions and hidden characteristics. Moral hazard problems refer to problems where the principal cannot observe the agent's action - such as effort. Adverse selection problems refer to problems where the principal cannot observe characteristics that can be observed by the agent - such as the firm's true costs.

removed from the day-to-day operations of the firm and cannot directly observe the effort managers on the job; they can only observe the profitability of the firm. The managers, on the other hand, know both their level of effort and the profitability of the firm. For example, a firm's shareholders do not participate in the daily operations of the firm and do not observe the daily conduct of the firm's management. These shareholders, however, can read the annual reports and attend annual shareholders meetings to determine the profitability of the firm. Taxpayers, the owners of public firms, are even further removed from the daily operations of public enterprises. This asymmetry in information constrains the design of contracts between owners and management because contracts cannot be written directly on the level of effort exerted by managers. Contracts written on observable variables such as the firm's profit that do not provide inducements to the managers to exert effort could leave managers with little incentive to act efficiently. Managers would therefore exert less than the optimal level of effort. Less effort implies less care in keeping costs down and could thus be a source of inefficiency.36/

21. A large body of literature addresses the problem of designing an "optimal contract" under various assumptions about the degree of risk aversion of the manager and the form of the managers' utility function. Many of the models share the following features:37/ (i) the manager is risk averse; (ii) the manager has more information about the costs of production than the principal; (iii) the manager has an incentive to misrepresent the true costs in order to increase his own utility; and (iv) the main instrument used to induce the managers to act in the owners' interest is a contractual payment of contingent compensation to managers.

36/ Lafont and Tirole, "Using Cost Observation to Regulate Firms," Journal of Political Economy, Vol 94, No. 4, 1986, p. 614-641. See also Op Cit, Sappington and Stiglitz, p. 24-25.

37/ M. Marchand, P. Pestieau, H. Tulkens, "The Performance of Public Enterprises: Normative, Positive and Empirical Issues," in The Performance of Public Enterprises, Marchand, Pestieau, Tulkens (eds.), North Holland, 1984, p. 23.

Such a contingent award insures the managers against some of the uncertainty (managers are, as stated above, risk averse) but retains some uncertainty to provide an incentive to the managers. To illustrate, consider the two extremes: Compensation not tied to the firm's profitability, a flat wage, insures against uncertainty but removes all incentive for the manager to exert effort. Compensation fully tied to the firm's profitability subjects the manager to all the risks associated with production.

22. Although generally applicable results have not yet been derived,38/ the principal-agent literature on managerial incentives indicates that the separation of ownership and control of a public firm can be a source of inefficiency. The problem can be explicitly handled by modifying the managerial incentive structure and accountability on a case-by-case basis. It cannot simply be assumed that public sector managers act in the public interest, as was done in the optimal pricing literature.39/ Rather, managers' contracts and terms of employment must provide incentives to induce them to act as if they were maximizing the government's objectives. Access to information to monitor managerial performance is essential to the success of such an incentive structure; information available to owners enables them to draft contracts which include terms for managerial rewards based on performance. Therefore, efforts to increase efficiency in public transport should consider appropriate managerial incentives and improvement in the quality of information available to the government for monitoring managerial performance.

Management and Labor

23. The problem of control between management and labor is similar to the problem of control between owners and managers. In this case the

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38/ Op. Cit., Marchand, Pestieau, and Tulkens, p. 24.

39/ D. Bos and W. Peters, "Privatization, Internal Control, and Internal Regulation," Journal of Public Economics, 36, 1988, p. 231-258.

manager is the principal who designs a contract which induces workers to exert an optimal level of effort, given the limited ability of management to observe labor's exertion of effort on the job. Such a contract may result in wages higher than the marginal productivity of labor (i.e. the competitive wage rate). These "efficiency wages"40/ reward labor for not shirking on the job by paying a high wage. If a worker is caught shirking, the punishment is losing his/her job and spending time unemployed.

24. The relationship between pay and effort is well-known and has been addressed in other studies of public sector reform.41/ Viewing labor agreements in a principal-agent framework, however, highlights the key elements to the success of increasing wages: the positive probability that a worker will be discovered if he/she shirks on the job and the positive probability of dismissal. Extensive interviews with railway managers and others in this field reveal that inadequate pay, wage compression and difficulty of dismissal are largely responsible for low worker morale, lack of motivation and, in the extreme, absenteeism when workers report to work merely to retain their secure positions.42/ To increase productivity adequate incentives should therefore be paid to labor, combined with the institution of an effective monitoring system that enables managers to detect shirking on the job. Employees must also recognize that their positions are not secure, but may be lost through dismissal or by closure of the enterprise.

40/ See Janet Yellin, "Efficiency Wage Models of Unemployment," The American Economic Review, Vol. 74, No. 2, May 1984, p. 200-205. and Carl Shapiro and Joseph Stiglitz, "Equilibrium Unemployment as a Worker Discipline Device," The American Economic Review, Vol. 74, No. 3, June 1984, p. 433-444.

41/ See David L. Lindauer, Government Pay and Employment Policies and Government Performance in Developing Economies, The World Bank, PPR WPS 42, August 1988, p. 9-11.

42/ Op Cit, Eric Beshers, p. 5-10.

Government and Enterprise

25. A third crucial layer of control is between government and the enterprise itself The government may impose financial targets, expenditure or cash limits, capital allocations, pricing and productivity targets, etc., on the enterprise. The imposition of these constraints will force the enterprise to operate inefficiently and employ a non-optimal mix of inputs.43/ A more complicated, yet more realistic, way to approach the problem of control between the government and the enterprise is to view these financial targets and capital allocations not as genuine constraints on behavior, but as resulting from the bargaining process between the government and the enterprise.44/ The government's goal is assumed to be welfare-maximization, whereas the enterprise is assumed to act in the interests of those who operate it: the managers and the workers.45/ The enterprise, thus prefers to be constrained to earn a relatively low level of profit and to receive a relatively high capital allocation. The determination of the financial constraint and the capital allocation are the outcome of discussions and negotiations between the government and the enterprise. However, the enterprise chooses which operational information to reveal to the government. Thus the financial constraint and capital allocation depend on the enterprise's strategic selection of information. The larger the asymmetry of information between government and the enterprise, and about the enterprise's operations, the less able government is to control the enterprise. The bargaining and negotiation process itself can also play a role in determining what constraints are placed on the enterprise.

43/ R. Rees, "A Positive Theory of Public Enterprise," in The Performance of Public Enterprises, Marchand, Pestieau, and Tulkens (eds.), North Holland, 1984, p. 179-191.

44/ H.S. E. Gravelle, "Bargaining and Efficiency in Public and Private Sector Firms," in The Performance of Public Enterprises, Marchand, Pestieau, and Tulkens (eds.), North Holland, 1984, p.193-220.

45/ This section is based on R. Rees, "The Public Enterprise Game," Economic Journal, 1984, p. 109-123.

Regulation

26. Regulation is ultimately a means to induce private enterprises to behave in a more socially optimal way than if they were left unregulated. The regulating agency is assumed to have the goals of the government and has the task of designing regulations which induce the enterprise to act as if it too were maximizing government objectives, rather than its own.46/ Regulation of this sort is often applied to private transport enterprises which, if left unregulated, would reduce services and charge higher prices in pursuit of higher profits. Regulation may, for example, require a transport enterprise to provide certain unprofitable services, maintain low prices for particular classes of consumers, or employ a specified number of workers. Regulated, privately-owned enterprises may encounter the same problems as public enterprises whose objectives are the same as those mandated by regulation.

27. Regulation may explicitly change the constraints under which a firm operates and create distorted incentives in the use of resources. A well-known example of this phenomenon is the Averch-Johnson effect of rate-of-return regulation.47/ An increasing returns to scale firm, a natural monopoly, is allowed to earn no more than a specified rate of return on its captial. A profit-maximizing natural monopoly operating under this constraint overcapitalizes -- employs more capital than in the optimal (unconstrained) input mix. Rate-of-return regulation in conjunction with lump-sum subsidy payments can lead to overcapitalization beyond the Averch-Johnson results.48/ Rate of return regulation is

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46/ John Vickers and George Yarrow, Privatization: An Economic Analysis, The MIT Press, Cambridge, 1988, p. 99-118 and Op Cit, Sappington and Stiglitz, p. 19. Regulatory agencies may also have their own goals which may be distinct from government's goals.

47/ Rate of return regulation allows a firm to earn a "normal" rate-of-return on its capital. See H. Averch and L. Johnson, "Behavior of the firm under regulatory constraint," American Economic Review, Vol. 52, 1962, p. 1052-69.

48/ Op Cit, Kim and Spiegel, p. 105-119.

relevant for public enterprises as well as private firms, since it constrains the public enterprise's goal of welfare-maximization and distorts their input mix.49/ It can therefore be concluded, that rate-of-return regulation imposed on public sector production is a potential source of inefficiency.

28. A pervasive consequence of regulation in transport is the creation of a protected market -- essentially granting monopoly power to the public or private enterprise. This regulation is often called "institutional" barriers to entry, rather than a barrier to entry arising from the nature of the market or of production itself. Typical examples in transport include: licensing requirements for vehicles, restricted entry into urban transport, area and route licensing for buses, trucks, and civil aviation, zoning or planning commission regulations, and high costs of conducting environmental impact studies and legal fees for entry. Private transport enterprises may also cooperate to reduce competition by self-regulating operations and setting fares.50/ If these regulations are effective, then the public or private firm enjoys a monopoly position and, as discussed below, may have little incentive to minimize costs.

Market Structure

29. It has long been observed that a firm which enjoys monopoly power might produce output at a higher cost than would a firm operating in a competitive market. It is believed that lack of competition widens the area for discretionary behavior in the organization and eliminates the discipline on the enterprise to lower costs.51/ Standard microeconomic theory, however, implicity rules out any connection between

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49/ Op Cit, Dieter Bos, p. 156.

50/ In Yemen driver cooperatives effectively operate route licensing systems and set tariffs for passenger and freight transport. Transport Sector Review, Study Report, Yemen Arab Republic Central Planning Organization, February 1982, p. 5.

51/ Op Cit, A. Israel, p. 93.

a dominant position in the output market and a firm's costs. In producer theory the cost function of a competitive firm is assumed to be the minimum cost of producing a level of output with given input prices.52/ When moving beyond the competitive market, all firms are still assumed to be profit maximizers, which justifies borrowing the cost function from the competitive market and attributing cost minimizing behavior to the monopolistic firm (or imperfectly competitive firm) as well.53/ Under these assumptions traditional microeonomic analysis cannot provide any understanding of why monopolistic firms, or other firms enjoying a certain degree of market power, may not be operating at minimum cost. As a consequence, little theoretical work has been done to describe how output markets can affect a firm's cost function.54/

30. Leibenstein first coined the term X-inefficiency to describe the phenomenon that a firm may not be operating at minimum cost.55/ Although X-inefficiency described the lack of cost minimization in private firms, the concept is also appropriate for studying the inefficiency of public firms. Many public enterprises are natural monopolies, or monopolies protected by regulation. Examples of natural monopolies in transport include railroads or bridges; an example of monopoly by regulation could be urban transport. The lack of competitors or potential competitors in the output market, or the lack of substitutes can be a cause of X-inefficiency in these firms.56/ One explanation of X-

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52/ Hal Varian, Microeconomic Analysis, W.W. Norton & Company, New York, 1984, p.21.

53/ Ibid, p. 80.

54/ J. Tirole, The Theory of Industrial Organization, MIT Press, Cambridge MA, 1988, p.78.

55/ H. Leibenstein, "Allocative Efficiency vs. 'X-Efficiency'," American Economic Review, Vol. 56, 1966, p. 392-415.

56/ See Op Cit, Vickers and Yarrow, p. 53-76 for possible limitations of the effectiveness of competition to provide incentives for internal efficiency in private firms as well: in-contestable markets, strategic entry deterrence, and predatory behavior.

inefficiency is that control of a firm's managers by the firm's owners (shareholders) is more difficult under monopoly than under competition. The owners do not have "yardsticks" of performance available from observing the performance of rival firms for use in evaluating their own managers' performance.57/ The absence of "yardsticks" by which to measure managerial performance could create lack of cost minimizing behavior in both private and public sector monopolies. In the discussion on the principal-agent problem above, it was argued that imperfect information constrains the design of optimal contracts for managers. Information is valuable to owners to the extent that the information enables owners to draft contracts which induce managers to exert the optimal level of effort. Competition can provide such a valuable source of information; managerial rewards can be based on performance comparisons with managers of rival firms.58/ Competition can also lower labor costs and increase productivity if management and labor recognize that high wages and restrictive practices reduce the competitiveness of the enterprise and perhaps threaten its very survival.

31. Owners, either private or public, of natural monopolies or monopolies protected from competition by institutional barriers lack information to evaluate managerial performance. Therefore privatizing public monopolies might not solve the problem of inefficient production. Public ownership, however may entail problems of control between owners and managers distinct from those of a private firm. The issue of public ownership and its effect on cost minimizing behavior is examined below.

Capital Markets and Public Ownership

32. Public sector production may be less efficient than private sector production due to the nature of public ownership itself. Public firms are owned by the many citizens/tax payers of a country, while

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57/ Op Cit, J. Tirole, p. 76.

58/ Op Cit, Vickers and Yarrow, p. 69.

private firms are owned by relatively few shareholders. Despite the lack of perfect information about managerial performance, shareholders do exert a certain amount of control on the discretion of the managers.59/ If a certain level of profits are not maintained then the shareholders could either vote the management out of office, or sell off their shares and invest in another firm.60/ Bankruptcy and takeovers are other means by which managers may lose control of a company.61/

33. The managers of public firms, in contrast, are not under the same direct pressure to perform as their counterparts in the private sector. In the public sector, the owners of the firm are the citizens/taxpayers. Each individual member of the public will find that the personal cost of influencing the policy of an enterprise (moving residence, voting with one's feet, or political action) considerably higher than the potential gain from reducing the enterprise's inefficiency. The agency problem would also play a larger role in public production because the cost to each member of the public of obtaining information would also be greater than the expected benefit of reducing managerial discretion.

34. This explanation of public sector production inefficiency must be qualified as applicable, especially in a developing country context. First, many countries do not have a market for shares, let alone an active capital market. Secondly, it is not clear that all taxpayers consider themselves owners rather than victims of public sector production. There is evidence that "citizens at large" are

59/ See Robert Millward and David Parker, "Public and Private Enterprise: Comparative Behaviour and Relative Efficiency," Chapter Five in [illegible], Longman Ltd., New York, 1983, p. 215-218. and Vickers and Yarrow, p.8-11.

60/ This argument critically depends on the existence of efficient capital markets. Servaes and Stiglitz also point out that individual shareholder may not be motivated to exert pressure on the firm's management due to the free-rider problem. p. 7.

61/ Op Cit, Vickers and Yarrow, p. 25-26.

willing to take action against perceived or real corruption and general inefficiencies of the public bureaucracy and public sector. Actions may also be taken against economic ills resulting from fiscal spending on inefficient public production. Yet these actions are often aimed at the general structure or specific economic austerity measures, rather than the inefficiencies of a particular firm, unless the firm provides services directly to a particular constituency. In this case, protest and action to improve the performance of the public enterprise, Hirschman's "voice", require organization of the affected group.62/ Thirdly, the citizen/taxpayer may be a beneficiary of public sector inefficiency. The lack of a control mechanism for the managers or employees may result in a slack work environment at guaranteed wages. Thus the citizen/taxpayer is not likely to exert pressure on public firms to minimize costs as does the shareholder of a private firm.

35. Public enterprises, in contrast to private firms, often do not face the threat of insolvency, the ultimate disciplinary threat facing private firms in a competitive market. A public firm may be protected by the government from bankruptcy by funds to cover deficits, tax exemptions or soft credit terms. As discussed above, expectations of receiving transfer payments to cover deficits "softens" the enterprise's budget constraint and removes the behavioral constraint which promotes cost minimization.63/

Empirical Evidence

36. Despite the large body of theoretical literature attributing inefficiency of public firms to public ownership, there is little

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62/ A. Hirschman, Exit, Voice, and Loyalty, Harvard University Press, 1970, p.30.

63/ Private firms, however, may also enjoy government protection from insolvency. Large private firms which employ a large number of workers may be saved from bankruptcy by the government in order to prevent mass unemployment and social dislocation. Chrysler Corporation in the U.S. is one well-known example.

empirical evidence supporting this result. Empirical studies comparing public and private firms in the same industry and operating in the same market have found that ownership is not a significant variable in determining costs.64/ While moving from a protected market to a competitive market may reduce the costs of urban public transport,65/ the few studies comparing costs of public and private transport enterprises operating under the same market conditions do not support the proposition that public enterprises are less efficient. While the private Australian airline was found to be more efficient than the state-owned airline,66/ there was no significant difference in operating costs between Canada's private and public railroads.67/

37. A potential explanation for this empirical result is that private firms may be inefficient for the same reasons that the public firms are inefficient. Each of the causes of inefficiency described above -- asymmetric information and principal-agent problems, market power, and regulation -- can lead to inefficiencies in both private and public firms. Privatization might not therefore be the correct remedy for public sector inefficiency, since the resultant private firm may be inefficient as well. A policy designed to rectify the cause of inefficiency -- such as modification of managerial incentives, introduction of competition, regulatory reform, or any necessary combination of these -- could be more effective in promoting efficient production than privatization, or any other policy reform used in isolation.

64/ Op Cit, Millward and Parker, p. 235-259.

65/ S. Glaister and W. Cox, "Report on Worshop 3: The Bidding Process," Conference on Competition and Ownership of Bus and Coach Services, Thredbo, Australia, May 1989, p. 2-3.

66/ D. Davies, "The efficiency of public versus private firms: the case of Australia's two airlines," Journal of Law and Economics, 14, 1971, p. 149-165.

67/ Caves and Christensen, "The relative efficiency of public and private firms in a competitive environment: the case of Canadian railroads," Journal of Political Economy, Vol. 88, 1980, p. 958-76.

IV. A FRAMEWORK: IDENTIFYING CAUSES OF INEFFICIENCY IN PUBLIC TRANSPORT

38. It is difficult for an economist or auditor to distinguish between the expenditures used to accomplish the various and often competing goals of public enterprises. Managers of public enterprises may even disguise production inefficiencies as the necessary costs of pursuing other goals of the enterprise. Reform of public transport to promote cost minimizing behavior must therefore consider the various possible causes of inefficiency in a systematic and integrated manner. Focusing on one source of inefficiency in isolation could lead to facile, ineffective reforms if other sources of inefficiency are not addressed as well. The framework developed here provides a generic method of identifying the causes of inefficiencies in public transport.

39. From the above discussion five interrelated causes of inefficiency in public sector transport can be deduced:

(i) The goals of the enterprise, or regulatory constraints on its operations.
(ii) The structure of the output market.
(iii) The control mechanism between government and the enterprise.
(iv) The managerial incentive structure.
(v) The conditions of employment for labor.

These five areas should be examined in turn to identify causes of inefficiency and to help formulate an appropriate combination of reforms to promote improved efficiency. Following the steps below enables the reformer to pinpoint links and interdependencies between the alternative reform policies. Success of reforms at each step critically depends on reforms in the previous steps. Designing control mechanisms between each layer in the hierarchy for controling the enterprise (the last three steps) relies on the definition of the enterprise's goals and the structure of the output market (Steps 1 and 2) for criteria to evaluate

the performance of the enterprise, its management, and labor. Success of reforms also depends on the steps which follow. For example, introducing competition (Step 2) cannot succeed unless the control mechanism between the government and the enterprise (Step 3) reinforces the discipline of the competitive market.

Step 1: The Goals of the Enterprise

40. The first step in analyzing the causes of inefficiency in public transport is the delineation of the goals of the enterprise, or the regulations imposed on it by the government. If the goal of the enterprise is simply to maximize consumer welfare -- the provision of transport services at minimum cost -- and the enterprise is not constrained by regulations, then the analysis proceeds to Step 2. If the enterprise pursues goals other than maximization of consumer welfare, the description of these goals is the first task in identifying their contribution to operational inefficiency. Goals of transport enterprises may include distributional objectives, or provision of secure employment. While these goals may not be clear-cut objectives of the enterprise, the government may impose these goals through regulations. For example, the government may regulate fares to provide low-price services for low-income customers or favored interest groups, or the government may strictly regulate the labor market. A politically powerful labor union may also be able to impose labor intensive work rules on the enterprise as effectively as explicit government regulations.

41. Once these goals and their effects on operational efficiency have been identified and recognized, a choice can be made between the costs and benefits of pursuing these goals. Whether or not the objectives are changed, specifying the goals of the enterprise is a prerequisite to measuring the performance of the enterprise and evaluating the performance

of -- and fixing incentives for -- its management.68/ Contract plans can be useful in delineating the objectives of the enterprise.69/

Step 2: The Structure of the Output Market

42. The structure of the output market may influence the operational efficiency of a public transport enterprise. While a competitive output market provides both market discipline and information necessary to design control mechanisms for the enterprise, management, and labor, market power may be a source of inefficiency. If the enterprise operates in a competitive market, proceed to Step 3. If the enterprise is a monopoly or occupies a dominant position in the market, the source of this market power must be ascertained. Market power can result from regulation, absence of alternative modes of transport, or increasing returns to scale of production.

43. Deregulation to remove barriers to entry, introduction of competition or competition surrogates can increase the pressure on a public enterprise to produce efficiently. In the case of deregulation, the actual or potential entrance of rival firms can force an enterprise to lower costs to remain competitive or prevent entrance of a rival firm. In the case of a natural monopoly which does not face competition from potential entrants,70/ market surrogates can help compel the firm to operate efficiently. These surrogates can include the pressure from clients or beneficiaries of the enterprise,71/ or competitive bidding

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68/ Op Cit, A. Israel, p. 48-52.

69/ Contract Plans also stipulate performance objectives for the enterprise and government obligations to the enterprise. Contract Plans, however, are not legally enforceable documents and therefore cannot substitute for the control mechanism between government and the enterprise. See J. Nellis, Contract Plans and Public Enterprise Performance, The World Bank, PPR WPS-118, October 1988.

70/ ie. a natural monopoly operating in a non-contestable market.

71/ Op Cit, Hirschman, p. 63.

against sub-contractors to provide selected in-house services.72/ Introduction of competition or market surrogates, however, cannot generate operational efficiency unless the control mechanism between government and the enterprise reinforces the discipline imposed by competition and incorporates any information provided by a competitive market.

Step 3: The Control Mechanism between the Government and the Enterprise

44. The control mechanism between the government and the enterprise may "soften" the enterprise's budget constraint and undermine market discipline or other inducements to lower costs. In the case of an enterprise which is a department or agency of the government, most revenues collected are deposited directly with the Treasury and budgetary allocations from general fiscal revenues cover the costs of operations.73/ Revenues and expenditures are not matched and are recorded on a cash basis. Expenditure allocations cannot therefore be contingent on performance, because such an accounting system does not provide information on profitability and performance of the enterprise. In addition, while the government may prescribe a level of revenue to be raised, few restraints are possible on the level of costs if the costs are covered by an allocation of fiscal revenues decided as part of the annual budgetary process.74/ In this case, the competition for public funds and the bargaining process between the government and the ministry or enterprise can inhibit costs: the procedures for allocating government expenditures determine the level of expenditures and the "softness" of the enterprise's budget constraint.

72/ Op Cit, Heggie, p.26.

73/ Op Cit, Heggie, p. 28.

74/ Other consequences of an agency's "soft" budget constraint may be the poor revenue administration and the lack of control of expenditures described in I. Heggie and M. Quick, A Framework for Analyzing Financial Performance of the Transport Sector, Working Paper No. WPS 356, February 1990, p.11-13.

45. Although a public transport enterprise may have its own operating budget and an accounting system which could provide information on performance, the government may nonetheless subsidize the enterprise or grant soft credit terms to cover deficits or fund investment.75/ The government may also protect the enterprise from dissolution by these measures. The more the enterprise can rely on subsidies and soft credit terms, the more their receipt is built into the expectations of managers and the softer will be the budget constraint. The soft budget constraint may destroy not only incentives to perform efficiently, but may weaken the desire to maintain adequate information to evaluate this performance. The softness of the budget constraint encourages poor record keeping, lack of control of expenditures, and the ex post adjustment of accounts which is so pervasive in public transport enterprises in developing countries.76/ The expectation of transfer payments to cover total costs eliminates the incentive to maintain records of expenditures - the matching of revenue with expenditures becomes merely an accounting identity. It is important to reiterate here the effects on operational efficiency of implementing a firm-specific optimal pricing formula for cost recovery. Prices that allow an enterprise to cover costs taking the costs as a given removes the incentive to reduce costs because higher costs are simply recovered through higher prices.

46. The success of enterprise reform depends critically on the information the government has to evaluate the performance of the enterprise and the discipline imposed on the enterprise by the government and the market place. The firmness of the budget constraint and the possibility of the enterprise becoming insolvent if production is not efficient, may also induce management and labor to lower costs.

75/ The following comments also apply to private firms which receive government subsidies, soft credit terms, or tax credits.

76/ Op Cit, Heggie and Quick, p. 13.

Step 4: Managerial Incentive Structure

47. Managers may have little incentive to exert effort to minimize costs because their efforts cannot be measured or observed and their performance may not be rewarded. Managers of public transport enterprises may also face little pressure to perform because they cannot easily lose control of the enterprise: the government may protect the enterprise from insolvency and dissolution. An effective incentive system that induces managers to exert effort to lower costs would require explicit managerial objectives, criteria to measure achievement of these objectives, rewards for performance, and sanctions for inefficiencies. If the existing managerial incentive structure does not include these elements, the structure can be reformed: the goals of the enterprise can be defined (Step 1), information to evaluate performance can be obtained by introducing market discipline (Step 2) and observing management of rival firms or, in an uncompetitive market, by instituting internal accounting systems. The information must be accompanied by a pay scale which rewards performance. The government can tighten the budget constraint of the enterprise by reducing or removing subsidies, hardening credit terms, and pricing according to costs (Step 3). Management that is rewarded for performance will have incentives to implement control mechanisms designed to increase labor productivity.

Step 5: The Conditions of Employment for Labor

48. Similar to management, labor may have little incentive to work efficiently: monitoring of effort may be difficult, performance not rewarded, and the possibility of being made redundant may be slim. Powerful labor unions may be able to impose labor-intensive work rules raising labor costs and lowering labor productivity.

49. Reducing the contribution of labor inefficiency to poor overall operational performance can be accomplished by reducing labor redundancy and designing a control mechanism which provides incentives for performance. Definition of goals (Step 1) determines the importance of

retaining labor as an objective of the enterprise. If providing employment is not a goal of the enterprise, policies can be designed to remove redundant labor.77/ The introduction of competition (Step 2) and firm budget constraints (Step 3) may convince organized labor that labor-intensive practices diminish the competitiveness of the enterprise and may result in the loss of all jobs through dissolution of the enterprise. Studies of rival firms (Step 2) or firms in similar services in other regions or countries may provide information to assess labor requirements. Increased wages paid to individual workers to increase productivity must be accompanied by information to evaluate performance, combined with the possibility of reduction of benefits or dismissal. The success of such a program depends on managers who have incentives to perform and who exert effort to monitor, motivate, and evaluate their workers (Step 4).

77/ See Op Cit, Galenson, p. 33-52.

V. THE CASE OF CONRAIL 78/

50. Conrail, which is now a private railroad, was owned by the United States government from 1976 to 1988. During much of that time, Conrail suffered financial losses of the order of $1 million a day. Taking a snapshot of Conrail while it was owned by the government, the analysis below sketches the major policy reforms which lowered Conrail's operating costs, increased its revenues and facilitated its sale to the private sector.

Background

51. Although railroads have traditionally been privately owned in the United States they have also been thought to be highly profitable monopolies. Following formation of the Interstate Commerce Commission (ICC) in 1881, they were therefore heavily regulated to ensure they served the public interest as well as the interests of their private owners. These regulations, dating from the years of the "robber barons," required railroads to maintain a wide range of unrenumerative services (favoring certain regions, classes of shippers, or particular passenger services), to abide by restrictive labor practices sanctioned, or imposed by the Congress at the behest of the rail unions, and to set specified rates which effectively subsidized passenger services. While overall operations were sustainable under these regulations until the end of the 1930s, post-war railroads became increasingly subject to competition from trucking for freight traffic, and airlines, buses, and private cars for passenger traffic. The railroads rapidly lost their profit margins. The problem was most severe in the Northeast as the structure of the regional economy

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78/ The sources of information for this part are Eric W. Beshers, Conrail: Government Creation & Privatization of an American Railroad, INUTD Discussion Paper, No. 38, March 1989 and conversations with, and information provided by, Louis Thompson, Railways Advisor, INUTD, The World Bank.

shifted from manufacturing to service-oriented industries. In 1970 the Penn Central Railroad (PC) applied for bankruptcy. Railroads in the United States, however, were prohibited from liquidating as would have been the case with other businesses. Following the law, rather than permitting liquidation, the Federal bankruptcy judge assigned to the PC case ordered a financial restructuring of the railroad in search of an income-based reorganization. In early 1973 when the PC Trustees, following the procedures required by the Railway Labor Act, put forward a plan to eliminate redundant labor and thus reduce operating costs (since, without these changes, an income-based reorganization was impossible), the rail unions went on strike and stopped operations. Congress responded immediately by passing legislation to override a proposed cut in crew sizes and required the railroad to resume operations. In the interim it also agreed to provide a subsidy to compensate the owners. The bankruptcy judge, however, determined that PC was so burdened by uneconomic services, rates set below costs, and excess labor that revenues simply could not cover the railroad's operating costs and that financial reorganization would be futile without the necessary changes. Ruling that requiring PC to continue operating under these conditions violated the Fifth Amendment of the US Constitution, which prohibits the use of private property for public use without just compensation, the judge ordered the railroad to be liquidated.

The Birth of Conrail

52. The decision of the bankruptcy judge to liquidate Penn Central forced the government to act quickly if it wished to maintain rail service in the Northeast. Under the Regional Rail Reorganization Act of 1973, the government created Conrail to acquire and operate designated portions of the bankrupt PC. The United States Railway Association (USRA), established to be independent of Congress, the Department of Transportation (DOT), and the ICC, was charged with studying the feasibility of Conrail and designating which properties should be conveyed to the government. Congress instructed the USRA to organize a rail service that was self-supporting, met the region's service requirements,

preserved existing patterns of rail service, provided passenger services, and minimized job losses in places served by the existing rail system. In 1976, most of the assets of the bankrupt PC were conveyed to Conrail via the government.

The Operation of Conrail

53. In initially pursuing the goals listed above, Conrail operated as a publicly-owned railroad with essentially the same constraints as did the privately-owned PC operating under regulation. The financial performance of Conrail was consequently little different from that of PC; at the outset it continued to lose about $1 million per day. However, when Congress was faced with the facts of Conrail's condition, and after it was convinced that no other solution was possible, it chose to reform the railroad rather than continue to finance operations indefinitely. Meanwhile, by the late 1970's, the rail unions realized they had lost the ability to dictate the labor conditions initially set out in Congress' response to the PC bankruptcy. Recognizing that the entire US rail industry was facing serious financial difficulties -- Midwestern rail companies were facing bankruptcy and one company had actually been liquidated -- and that Conrail could not rely on Congress for unlimited financial support, the rail unions were finally willing to accept wage and labor force reductions to help bolster the railroad's financial position.

54. With the support of a broad constituency of rail interests which supported regulatory reform, including rail labor, the Staggers Act of 1980 (which dealt primarily with regulatory reform) and the Northeast Rail Service Act (NERSA) of 1981, removed many of the regulations which had precipitated the collapse of PC and were largely responsible for Conrail's poor financial condition. The Staggers Act allowed railroads wide latitude in setting rates, permitted them to enter into contracts with shippers, and liberalized procedures for abandoning unremunerative lines. NERSA formalized the unions' wage concessions to Conrail, relieved Conrail of all obligation to carry commuter passengers, and specified Conrail's right to eliminate labor positions and limit severance pay. If

local and state authorities desired commuter rail services, they had to assume responsibility for supporting these services; the Federally supported Amtrak had, since 1971, taken over responsibility for all intercity passenger services. The provisions in NERSA allowed Conrail to earn a profit and achieve the Act's objective of returning rail services to the private sector. Costs fell and efficiency rose dramatically in the two years following reform: operating costs fell 33 per cent and ton-miles per employee rose 32 per cent between 1981 and 1983. In 1986, Conrail's stock was sold to the public and the corporation was successfully returned to the private sector.

Analysis

55. The analysis below, following the Steps of Chapter IV, illustrates some of the important connections between the goals of the enterprise, the market structure, the control mechanism between government and the enterprise, and labor employment policies in executing successful railroad reform. At the outset, it is important to reiterate Besher's observation that certain individuals -- combined with sustained political will on the part of the Administration and Congress -- played crucial roles in the success of the railroad reforms. He also noted that it took thirteen years and $8 billion to complete the reform of the Northeastern railroad that eventually sold for $2 billion, demonstrating that successful reform of transport enterprises is a slow, difficult and expensive process, even in a comparatively wealthy and stable society like the United States.

Step 1: The Goals of Conrail Conrail's initial goals were to be self-supporting, meet service requirements of the Northeast, preserve existing patterns of rail service, provide required passenger services, and minimize job losses in places served by rail. The interests of the rail unions were embodied in legislation that maintained existing overstaffing levels. Thus an implicit initial goal of Conrail was to provide employment. The pursuit of these mutually incompatible corporate goals resulted in operational inefficiency: high labor costs together with the

losses involved in maintaining services on unremunerative lines. In the late 1970's it became clear to the government, unions, and state and local authorities that, under current market conditions, accomplishing the multiple and conflicting goals of Conrail would not be possible without access to continuing flows of Federal funds. Direct Federal payments to Conrail exceeded $3 billion between 1976 and 1981. The costs of achieving these goals were considered too high in relation to the benefits accruing to the particular constituencies whose interests were served by the prevailing rail regulations.

Step 2: The Output Markets Conrail's predecessor provided services in three separate markets: freight, commuter services, and inter-city passenger services. There was strong competition from alternative modes of transportation in each of these markets. While competition provided incentives to lower operating costs, regulations restricted Conrail's ability set fares, wages and employment levels. Despite the competitive market environment, these restrictions constrained earnings and raised operating costs. Treating each market separately, however, helped to locate profit centers and identify areas of financial weakness. As a result, Conrail eventually conveyed or closed its unremunerative services and transferred responsibility for passenger services to local or Federal control.

Step 3: The Control Mechanism between the Government and Conrail The control mechanism between the government and Conrail temporarily removed the competitive pressures on Conrail to reduce costs. Government funding "softened" the budget constraint by covering all those operating expenses not covered by revenues. Although the Conrail Board included the Secretary of Transportation -- a fact which, with suitable technical support, gave the Administration access to the same information as Conrail management -- the division of control and responsibility among Conrail, the Administration, and Congress hampered the ability of the Administration to reform the railroad. While the Administration had direct access to information on Conrail's performance, Congress did not. Conrail built a constituency in Congress which initially prevented the

administration from using the leverage implicit in its superior information to institute regulatory reform. Only when Congress agreed to the necessary reforms to privatize Conrail and prevent the establishment of a permanent "soft" budget constraint did it create a control mechanism capable of promoting operational efficiency. The establishment of a firm budget constraint -- an owner willing to liquidate the railroad and sell off its assets -- reinforced the market discipline of competition and persuaded management and labor of the necessity of fundamental reform.

Step 4: Managerial Incentive Structure The introduction of a firm budget constraint was reinforced by placing a competent manager in charge of Conrail. The new management was both convinced of the necessity to reshape the railroad and had the knowledge and capability to accomplish this task and run the railroad efficiently.

Step 5: The Conditions of Employment The labor unions, realizing that insolvency of Conrail and most other railroads was possible (and indeed that the government was quite willing to break up the corporation and sell off its assets to other railroads), compromised on labor practices to prevent dissolution of Conrail and loss of all jobs. The willingness of organized labor to agree to changes in working practices, wage reductions and general regulatory reform was a key element which contributed to lowering operating costs and improving service quality.

VI. CONCLUSIONS

56. This paper has identified possible causes of inefficiency in public transport: market power, principal-agent or control problems, regulation, and "soft" budget constraints due to subsidies or soft credit terms which protect enterprises from insolvency. This review helps to direct further research, both theoretical and empirical, to some of the issues not yet explored concerning costs in public enterprises. This research would advance the development of an integrated theory of public production.

57. The first issue to consider is the relationship between pricing policies and costs. Empirical work is needed to compare the welfare gains from instituting optimal pricing policies, with the welfare losses which might result from "cost drift" in firms which receive transfer payments. Theoretical work to integrate the receipt of transfer payments and the enterprises cost function, for both public and private firms, would provide an analytical framework within which to study the observed phenomena that costs "drift" in firms receiving government subsidies.

58. The second issue is the relationship between the nature of the output market and production costs. While introducing competition is promoted as a means of imposing financial discipline on a public enterprise, increasing pressures to minimize costs, there is little theoretical basis for this recommendation. Theoretical work is needed to formulate a model of costs that depends in some way on the firm's degree of market power. More sharply focussed empirical work would help determine the magnitude and causes of cost differences between enterprises operating in uncompetitive markets, compared with those operating in competitive markets. Case studies showing the impact of introducing competition into transport markets, and the cost response of enterprises facing such competition, would be a useful step in this direction.

59. A wider question is determining the relative efficiency of public and private sector production. First, the differences in control problems at all levels between public and private firms should be evaluated. Theoretically, the defining characteristics of public production should be modeled to distinguish public ownership from other features of public production, such as support from the government, problems of asymmetric information and control, and market power, which may be shared by private production. Once these defining characteristics have been modeled, the next step would be to model the relationship between public ownership and costs. More empirical work would then be required to discern the significance, if any, of ownership in explaining differences in costs between private and public firms. This investigation would enhance understanding of public production and inform the debate on appropriate policies for cost recovery and reducing inefficiency in the public sector.

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